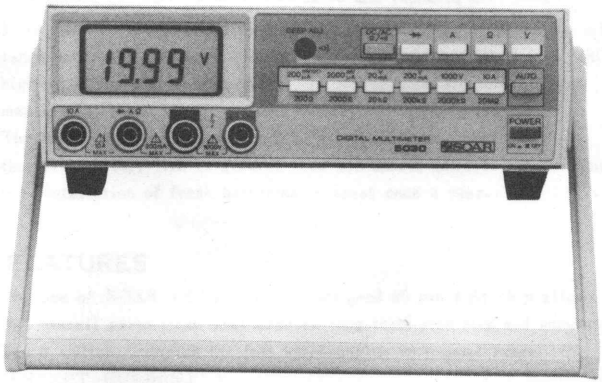
SPECIALISTS IN TESTING AND MEASURING INSTRUMENTATION

SOAR corporation

MODEL 5030 DIGITAL MULTIMETER

INSTRUCTION MANUAL



Thank you very much for selecting Soar Corp. advanced design Model 5030 Digital Multimeter. Many unique features have been included in this model that extends its application to include laboratory. field maintenance and quality control use. With minimal care your Model 5030 should render years of satisfactory service.

1. FACTS YOU SHOULD KNOW BEFORE YOU OPERATE YOUR MODEL 5030

1. Observe all safety rules while making measurements. CAUTION should be exercised when making measurements since dangerous voltages can be present in normally safe circuits or areas.
2. With the POWER SWITCH set in the "OFF" position, install the batteries, or connect the optional AC ADAPTOR and check to make sure the fuse is fully seated in its holder.
3. If the 5030 is NOT going to be operated for a long time, remove the batteries since damage can result from leakage.
4 Although the 5030 is electronically and fuse protected against overloads, care should be taken to avoid excessive and repeated overloads.
5. It is normal for the Model 5030 digits to "wander" when on the mV range since the DC input resistance is a very high 1000 Mohms, this high input resistance is needed when making accurate low voltage measurements.
6. The Model 5030 LSI circuit and LCD readout use little power, therfore, battery life is greater than 900 hours, however, we recommend the installation of fresh batteries at least once a year.

2. FEATURES

- The use of SOAR CORP. custom designed 80 pin LSI chip allows a low overall parts count that assures long term stability and accuracy.
- Touch switch selection for full auto-ranging or manual range. (EXCEPT CURRENT)
- Overload protection is built-in on all functions and ranges, surge protection up to 6000V.
- A fast response continuity check feature with "NO LOOK" audible beeper sound.
- The LCD readout includes annunciators for function, unit, polarity, decimal, low battery, continuity and diode test.
- Housed in a fully RFI/EMI shielded ABS plastic case with U bracket handle/tilt stand, ideal for bench or rugged field use.
  Safety designed probes, batteries, fuse and spare fuse are included.

3. SAFETY RULES

1. Before operating this instrument, familiarize yourself with all instructions outlined in this manual.
2. Always check to make sure test lead jacks are fully inserted into input terminals, and that the function/range selector switch is set to the proper position.
3. When taking measurements, use CAUTION as dangerous voltages may be present in normally safe areas.
4. Always disconnect the circuit under test prior to attaching test leads, as voltages may be present in capacitors even when the main power is disconnected.
5. To avoid electrical shock, use CAUTION when working above 60VDC or 25V AC rms.
   Such voltages pose a shock hazard.
6. Make sure all power (AC or DC) is disconnected (OFF) when making resistance (OHMS) measurements.

4. GENERAL SPECIFICATIONS

DISPLAY ..... 3½ digit LCD, Max reading 1999 and annunciators include mV, V, μA, mA, A, Ω, kΩ, MΩ, •)) (buzzer), B (low battery), AC, " — " (minus sign) and " →|— " (diode test)

OPERATION ..... Manual or automatic, (except current range).

POLARITY ..... Automatic no indication for positive polarity, minus (—) sign for negative polarity.

OPERATING TEMPERATURE ... 0°C to 40°C at 80% RH or less.

STORAGE TEMPERATURE ..... —20°C to 60°C at 70%RH or less.

CALIBRATION ..... Accuracy guaranteed for 1 year.

SAMPLING TIME ..... 2 times/sec.

BATTERY TYPE & LIFE ..... 4 × "C" size 1.5V, Approx 900 hours.

POWER CONUMPTION ..... Approx 18 mW (TYP).

AC OPERATION ..... Optional AC adaptor.

TEST LEADS ..... One Red, One Black, Safety type.
FUSE ..... 250V, 0.2A.
OVERRANGE INDICATION ..... MSD "1" or "−1" indicatcion.
SIZE ..... 7¼"×2¼"×7⅛" (W.H.D.)
(186×57×180 mm)
WEIGHT ..... Approx 900 g.

5. OPERATING SPECIFICATIONS

23℃± 5 ℃

DC V

Range	Reso-lution	Accuracy	Input Impedance	Overload protection
200mV	0.1mV	±0.25%rdg±2dgt	1000MΩ	DC 1100V AC 1100Vrms
2000mV	1mV	±0.25%rdg±1dgt	11MΩ	
20V	10mV		10MΩ	
200V	100mV			
1000V	1V			

AC V

Range	Reso-lution	Accuracy	Input Impedance	Overload protection
2000mV	1 mV	±0.5%rdg±5dgt (40Hz～500Hz)	11MΩ	DC 1100V AC 1100Vrms
20 V	10 mV		10MΩ	
200 V	100 mV			
1000 V	1 V			

OHM

Range	Reso-lution	Accuracy	Test current	Overload protection
200Ω	0.1Ω	±0.25%rdg±3dgt	0.7mA	250V (0.2A FUSE)
2000Ω	1Ω	±0.25%rdg±1dgt	0.1mA	
20kΩ	10Ω		30μA	
200kΩ	100Ω		4μA	
2000kΩ	1kΩ	±1.0%rdg±2dgt	0.4μA	
20MΩ	10kΩ	±2.0%rdg±2dgt	0.04μA	

DC A

Range	Reso-lution	Accuracy	Max Voltage drop	Overload protection
200μA	0.1μA	±0.75%rdg±1dgt	less than0.25V	0.2A FUSE
2000μA	1μA			
20mA	10μA			
200mA	100μA		less than0.7V	
10 A	10mA	±1.0%rdg±1dgt	less than0.25V	———

AC A

Range	Reso-lution	Accuracy	Max Voltoge drop	Overload protection
200μA	0.1μA	±1.0% rdg±5dgt (40Hz～500Hz)	less than 0.25V	0.2A FUSE
2000μA	1μA			
20mA	10μA			
200mA	100μA	±1.2%rdg±5dgt (40Hz～500Hz)	less than0.7V	
10 A	10mA		less than0.25V	———

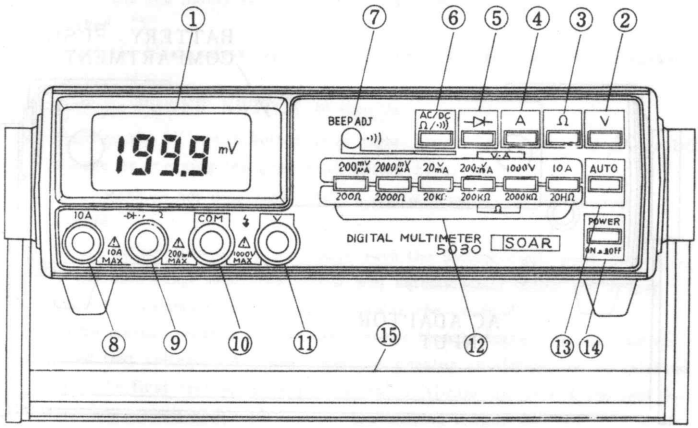
Diode Test

Range	Reso-lution	Accuracy	Test current	Open circuit voliage
0～2000mV	1mV	±5%rdg±1dgt	approx 0.6mA	approx 2.3V

Continuous check

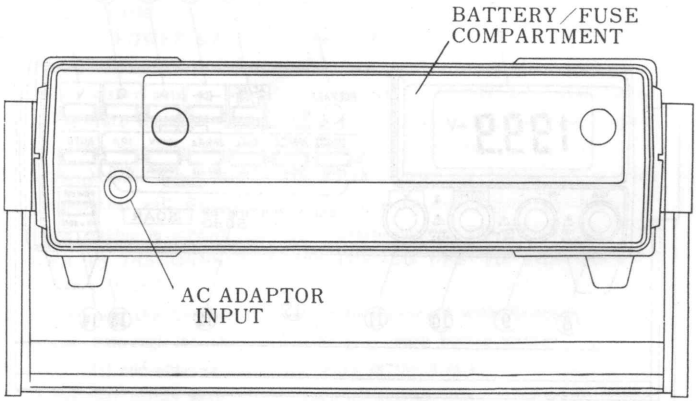
Range	Reso-lution	Ohms of test circuit	Test current	Open circuit voltage
0～200Ω	0.1Ω	Adjustable (10Ω～200Ω)	approx 0.7mA	approx 1.6V

6. PANEL FUNCTIONS



①··· LCD READOUT
②··· VOLTAGE SELECTOR
③··· RESISTANCE SELECTOR
④··· CURRENT SELECTOROR
⑤··· DIODE TEST
⑥··· AC/DC, Ω/ •)) SELECTOR
⑦··· **BEEP ADJ** (10Ω ~200Ω)
⑧··· 10 AMPERE AC/DC INPUT JACK
⑨··· AC/DC CURRENT/OHMS/ DIODE TEST INPUT JACK
⑩··· COMMON INPUT JACK
⑪··· AC/DC VOLTAGE INPUT JACK
⑫··· 6 MANUAL RANGE SELECTOR
⑬··· AUTO-MANUAL RANGE SELECTOR
⑭··· POWER ON-OFF SWITCH
⑮··· U BRACKET HANDLE/TILT STAND

7. REAR LAYOUT



8. BATTERY-FUSE INSTALLATION

1. CAUTION. Turn the POWER SWITCH "OFF" and remove the probes from all test circuits, prior to installings batteries or changing fuse.
2. To install the 4×1.5V "C" batteries supplied with your digital multimeter, remove the battery fuse compartment located on the unit back.
3. Insert the batteries firmly into the battery case making sure that the proper polarity is observed.
4. If the fuse blows, lift fuse out and replace with the spare provided making sure it is securely seated in its holder. Use only fuses with the same voltage and current rating as provided with your digital multimeter.
5. Securely replace battery-fuse compatment, NEVER MAKE MEASUREMENTS WITH THE BATTERY-FUSE COMPARTMENT OPEN

OPERATION

9. AC/DC VOLTAGE MEASUREMENTS:

1. Insert the red safety test lead plug firmly into the right hand socket marked "V".
2. Insert the black safety test lead plug firmly into the right center socket marked "COM".
3. Turn the POWER SWITCH to the "ON" position.
4. Depress the "V" push button (Top right) then select either the AC or DC voltage by pressing the gray push button (Top left). "DC" mark is not displayed "AC" mark will appear in the readout window.
5. Select either auto or manual range with the bottom right push button.
6. In the auto range mode the 5030 will automatically select the proper range for maximum resolution and display the results.
7. In the manual range mode, select a range that is higher than the anticipated test voltage. (A lower range for greater resolution can be selected after the first test measurement is made) Always disconnect the test leads from the circuit under test, prior to changing range.
8. Touch test leads to the circuit under test and observe the results in readout window.

10. AC/DC CURRENT MEASUREMENTS:

1. Insert the Red safety test lead plug firmly into the left center socket marked "$\rightarrow\!\!|\!\!\leftarrow$ −A−Ω" for all current measurements under 200 mA or into the left hand socket marked "10A" for all measurements of 200 mA through 10 amperes.
2. Insert the black safety test lead plug firmly into the right center.
3. Turn the POWER SWITCH to the "ON" position.
4. Depress the "A" push button (Top, 3RD from right) and then select either AC or DC current by pressing the gray push button (Top left) DC mark is not displayed. AC mark will appear in the readout window.
5. In the Manual Range Mode, select a range that is higher than the anticipated test current (A lower range for greater resolution can be selected after the first test measurement is made) Always disconnect the test leads from the circuit under test prior to changing range.
6. Touch the test leads IN SERIES with the circuit under test, and observe the results the readout window.

11. RESISTANCE MEASUREMENTS/CONTINUITY CHECK

1. Insert the red safety test lead plug firmly into the left center socket marked "→|←-A-Ω".
2. Insert the black safety test lead plug firmly into the right center socket marked "COM".
3. Turn the POWER SWITCH to the "ON" position.
4. Depress the "Ω" push button (Top, 2ND from the right).
5. Select either auto or manual ranging with the bottom right push button.
6. In the Auto Range Mode the 5030 will automatically select the proper range for maximum resolution and display the results.
7. In the Manual Range Mode, select a range from the bottom row of push buttons that will display the resistance value with highest resolution.
8. When making in-circuit resistance measurements, BE SURE ALL POWER IS DISCONNECTED OR TURNED OFF TO THE CIRCUIT UNDER TEST.
9. When using the Continuity Test Feature proceed with Reistance Test Steps 1 through 4, then press the gray push button marked "Ω/•))" (Top left) and observe the "•))" mark in the display. If the test points have a resistance of setting ohms or less, the continuity buzzer will sound. BE SURE ALL POWER IS DISCONNECTED OR TURNED OFF TO THE CIRCUIT UNDER TEST.

12. DIODE TEST

1. Insert the probes as described in resistance measurements steps 1 throgh 3
2. Depress the →|← (Diode) push button (Top, 4TH from right), the "→|←" sign will appear in the readout window.
3. Touch the test probes to the diode leads, if the diode is shorted, "000" will appear in the readout window. If the diode is open, then the reading of OVER will stay in the readout window.

A good diode will give a reading of between 500mV to 800mV. This is the forward voltage of the diode, if the test leads are reversed, the voltage will be blocked and a reading of "OVER" will be displayed indicating that the diode is good. Readings other than those mentioned usually indicate a leaky or defective device.

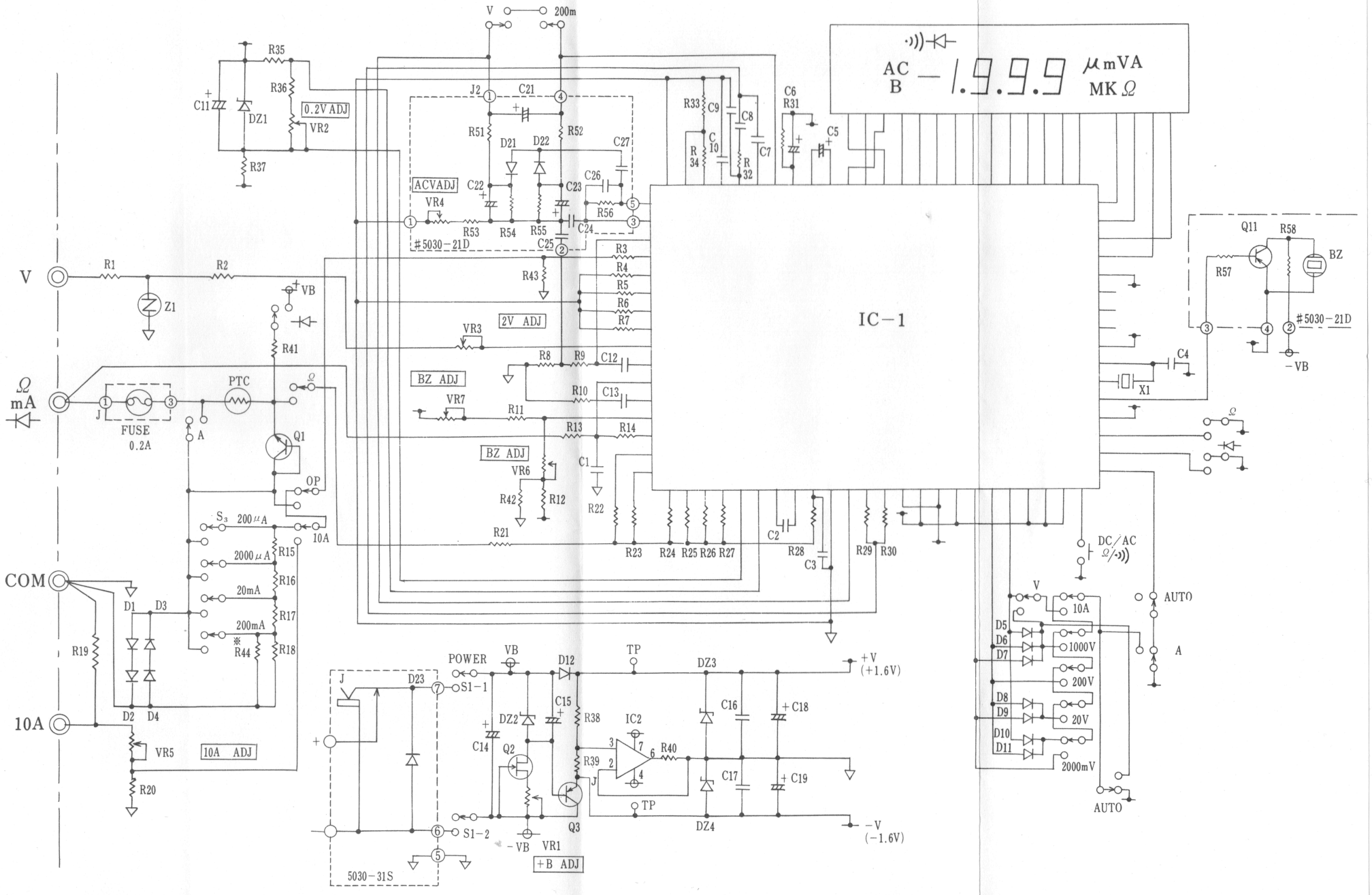
12. PARTS LIST

No.	NAME	DESCRIPTION	SPECIFICATION	QTY
IC 1	A/D CONV	5230GS		1
2	LINER	TLO61		1
Q 1	NPN TR	2SD-612K		1
2	FET	2SK-44-B		1
3,11	PNP TR	2SA-608SP-F		2
LCD		LD-B7073AZ		1
DZ-1	ZENER DIODE	1.2V		1
2~4	〃	5V		3
D 1~4	DIODE	U-05B		4
5~12, 21, 22	〃	DS442		10
23	〃	IN4001		1
Z 1	VARISTER		2000V	1
X 1	Xtal		32.768K	1
Bz	BUZZER			1
SW 1		SPH121A		1
2		SK-1005-Y28		1
3		SK-1005-071Q		1
VR 1	TRIMMER		10KB	1
2	〃		1 KB	1
3	〃		200KB	1
4	〃		1 KB	1
5	〃		10KB	1
6	〃		〃	1
7	〃		50KB	1
PTC	THERMISTOR		100Ω	1

No.		NAME	DESCRIPTION	SPECIFICATION	QTY
PB	1			#5030−12D	1
	2			#5030−21D	1
PJ			HEC0470−01−030		11
R	1	MF	MFC ½	10KJ	1
	2	〃	MGC−200	9.9MF	1
	3	CF	RD ⅛	100KJ	1
	4	MF	MFC ½	1KB	1
	5	〃	〃	10.01KB	1
	6	〃	〃	101KB	1
	7	〃	MGC−60	1.111MB	1
	8	CF	RD ⅛	510KJ	1
	9	〃	〃	10MJ	1
	10	〃	〃	100KJ	1
	11	CF	〃	33KJ	1
	12	〃	〃	15KJ	1
	13	MF	MFC ¼	274KF	1
	14	〃	〃	26.7KF	1
	15	〃	〃	900ΩD	1
	16	〃	〃	90ΩD	1
	17	〃	〃	9ΩD	1
	18	〃	½	1ΩD	1
	19	WW		SH1202−02	1
	20	MF	MFC ¼	22KF	1
	21	CF	RD ⅛	1KJ	1
	22	MF	MFC−30	16.35MD	1
	23	〃	〃	1.637MC	1
	24	〃	MFC ½	163.7KB	1
	15	〃	〃	16.37KB	1
	26	〃	〃	1.637KB	1
	27	〃	〃	163.6ΩB	1
	28	CF	RD ⅛	100KJ	1

No.	NAME	DESCRIPTION	SPECIFICATION	QTY
R 29	CF	RD 1/8	390KJ	1
30	〃	〃	270KJ	1
31	〃	〃	100KJ	1
32	〃	〃	1KJ	1
33	MF	MFC 1/4		1
34	〃	〃		1
35	〃	〃	62KF	1
36	〃	〃	9.1KF	1
37	CF	RD 1/8	12KJ	1
38	〃	〃	4.7KJ	1
39	〃	〃	〃	1
40	〃	〃	10ΩJ	1
41	〃	〃	2.2KJ	1
42	〃	〃	1KJ	1
43	〃	〃	10MJ	1
44	〃	〃	100ΩJ	1
R 51R	CF	RD 1/8	330KJ	1
52	〃	〃	〃	1
53	MF	MFC 1/4	20KF	1
54	〃	〃	22KF	1
55	〃	〃	〃	1
56	〃	MGC−30	39MJ	1
57	CF	RD 1/8	10KJ	1
58	〃	〃	4.7KJ	1
C 1	MPF		50V 0.022μ	1
2	〃		〃 0.1μ	1
3	〃		〃 0.047μ	1
4	CER		50V 39P	1
5,6,11	AE		35V 4.7μ	3
7,8	MPF		50V 0.1μ	2
9	CER		50V 2200P	1

No.	NAME	DESCRIPTION	SPECIFICATION	QTY
C 10	CER		50V 390P	1
12	MPF		50V 0.1μ	1
13	〃		〃 0.01μ	1
14,15,18,19	AE		10V 47μ	4
16, 17	CER		50V 0.022μ	2
C 21	TE		16V 0.1μ	1
22	〃		〃 0.47μ	1
23	〃		〃 〃	1
24	MPF		50V 0.22μ	1
25	〃		〃 〃	1
27	MPF		50V 0.22μ	1
J 1		HBRB7S−1J	7P	1
2		HBRB5S−1J	5P	1
3		〃	〃	1
4		FS2502	18P	18


AC
B
-1.9.9.9
μmVA
MKΩ
IC-1
V
200m
0.2V ADJ
VR2
ACVADJ
VR4
#5030-21D
2V ADJ
VR3
BZ ADJ
VR7
BZ ADJ
VR6
10A ADJ
VR5
+B ADJ
VR1
5030-31S
FUSE
0.2A
PTC
Q1
Q2
Q3
Z1
X1
Q11
BZ
#5030-21D
-VB
COM
10A
POWER
VB
TP
+V
(+1.6V)
-V
(-1.6V)
DZ3
DZ4
IC2
S1-1
S1-2
DC/AC
Ω/•))
AUTO
A
10A
1000V
200V
20V
2000mV
2000μA
20mA
200mA
200μA
OP